Venus Express Interoperability Project

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Venus Express Mission Overview

- Launched in November 2005
- Arrival at Venus in April 2006
- Currently in extended mission phase
- Unlike for Mars Express, there was no MOU to provide VEX data to the PDS... all data resides in the PSA

VEX Interoperability Project

- Conducted as an IPDA project
- Integrated PDS/PSA using PDS-D (PDS3 distributed infrastructure) coupled with IPDA emerging interface standards (PDAP)
  - Data remained at PSA
  - PDS was integrated into it
- Deployed in summer 2009; conducted an assessment with the user community to validate the concept
- Shortcomings were assessed and modifications are underway

Instrument Suite

Instrument	Heritage
Venus Monitoring Camera (VMC)	MEX
Analyzer of Space Plasma and Energetic Atoms (ASPERA)	MEX
Visible and Infrared Thermal Imaging Spectrometer (VIRTIS)	Rosetta
Venus Express Magnetometer (MAG)	Rosetta
Venus Radio Science Experiment (VeRa)	Rosetta
Spectroscopy for the Investigation of Characteristics of the Atmosphere of Venus (SPICAV/SOIR)	MEX

Datasets are ingested into the PSA and are accessible in PDS via http://pds-atmospheres.nmsu.edu/ve/

VEX/IPDA Results

Venus Express

The Venus Express (VEX) spacecraft was built by the European Space Agency to study the atmosphere and the surface of Venus. It was launched in November 2005 and it was inserted into orbit around Venus on April 11, 2006. Venus Express is equipped with seven instruments. Links to more detailed information regarding the instruments on board Venus Express are given below.

The data will be archived in the European Space Agency's Planetary Science Archive. To provide PDS Atmospheres Node users transparent access to VEX data, we are developing an interoperability protocol whereby users can link to the VEX data from this site.

Some of the VEX data are fully ingested into the PSA and are available through this interoperability protocol.

Image Courtesy of ESA

VEX mission phases

Phase Acronym	Phase name	Start Date	End Date	Duration (days)
LEOP	Launch and Early Orbit Phase	09/11/05	11/11/05	3
NECP	Near Earth Commissioning Phase	12/11/05	16/12/05	21
ICP	Interplanetary Cruise Phase	17/12/05	04/04/06	107
VOI	Venus Orbit Insertion	05/04/06	21/04/06	16
VOCP	Venus Orbit Commissioning Phase	22/04/06	03/06/06	42
NMP	Nominal Mission Phase	04/06/06	02/10/07	486
EMP	Extended Mission Phase	03/10/07	May 2009	

Data sets are split into the nominal mission (launch to end of nominal mission) and the extended mission (from 2/10/2007).

Follow the links below to access the VEX data that are currently available in the PSA archive.

VEX/IPDA Dataset Access

In the following tables the browse option allows you to navigate the directories and download one file at a time. The download option zips the dataset and prepares it for download. The browse option responds rapidly however the download option prepares the file before sending you to the download site. The download response is slow.

Instruments

Below is a listing of the seven instruments on board Venus Express along with a description of each instrument and the data collected.

ASPERA

"Analyser of Space Plasma and Energetic Atoms"
Led by the Institute of Space Physics, Kiruna, Sweden.
ASPERA studies the interaction between the solar wind and the atmosphere of Venus. It studies how molecules and ions escape the planet by measuring the particles in the solar wind, and the outflowing particles from the planet's atmosphere.

Instrument	CODMAC level	DATA_SET_ID	Data available up to			Data Volume (Gb)
ASPERA	2	VEX-V_SW-ASPERA-2-ELS-V1.0 VEX-V_SW-ASPERA-2-IMA-V1.0 VEX-V_SW-ASPERA-2-NPD-V1.0 VEX-V_SW-ASPERA-2-NPI-V1.0	N/A (under review)			

MAG

"Magnetometer"
Led by the Institut für Weltraumforschung (IWF), Graz, Austria.
Venus has no detectable internal magnetic field, and the field that exists around the planet is entirely due to the interaction between the solar wind and the atmosphere. The MAG magnetometer will study this process and will help in understanding the effect it has on Venus' atmosphere, for instance the effect on the atmospheric escape process.This instrument was newly developed for Venus Express, but it reuses sensor designs from the Rosetta lander.

Instrument	CODMAC level	DATA_SET_ID	Data available up to			Data Volume (Gb)
MAG	2	VEX-V/Y-MAG-2-V1.0	Oct-2007	browse	download	36.61
MAG	4	VEX-V/Y-MAG-4-V1.0	Oct-2007	browse	download	1.19

PDS 2010 Implications

- PDS 2010 planned services are critical to supporting international interoperability long-term
  - PDS will ensure PDS 2010 is interoperable with IPDA standards
  - The VEX activity paves the way forward
- Improvements in the PDS4 standards will be important for helping to move towards improved data sharing among agencies

Summary

- VEX interoperability served as a pilot project for international interoperability
  - Changed the dynamic for how data will be shared in the future
  - Implications for PDS long term in providing open access to data and services
- Efforts are underway to coordinate the development of PDS 2010 with IPDA